Statement of
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Comprehensive Watershed Management and Planning

Chairman Johnson, Members of the Committee. It is a distinct privilege to participate in this important and timely hearing and I want to thank the Committee for the opportunity.

I am Gerald E. Galloway, a Glenn L. Martin Institute Professor of Engineering and Affiliate Professor of Public Policy at the University of Maryland where I teach and do research in water resources. I came to that position following a 38 year career in the US Army and eight years service in the federal government, most of which was associated with water resources management. I served for three years as District Engineer for the Corps of Engineers in Vicksburg, MS and later, for seven years as a member of the Mississippi River Commission. I also serve, on a part-time basis, as a visiting scholar at the Corps of Engineers Institute of Water Resources in Alexandria, VA and as a consultant to a number of organizations. In 1993 and 1994, I was privileged to be assigned to the White House to lead an interagency study of the causes of the Great Mississippi River Flood of 1993 and to make recommendations concerning the nation's floodplain management program.[1]

I come today to speak to the need for a focus on watershed planning and management as we continue the development, maintenance and restoration of our nation's water resources. Hurricane Katrina, the Great Mississippi flood of 1993, and the current flooding in the Upper Mississippi Basin point to the need to deal with water resource issues in their watershed context. Our water resources cannot be sustainably, efficiently and safely developed if we continue to address problems within a watershed on a project by project basis

A watershed is an area of land that drains water and the sediments and other materials it carries into a common river or outlet. It can be small, with a few acres, or large, such as the Mississippi watershed, which drains 41% of the contiguous United States. Larger watersheds are typically identified as basins and in many countries, watersheds are called catchments. Today I will use the terms watershed and basin interchangeably.

Watershed planning and management address land and water resources use on a watershed basis to achieve desired environmental, social, and economic goals. This planning and management activity recognizes linkages among land use, soil loss conservation, water quantity and quality,

ecosystem dynamics, as well as social and economic factors. It also considers the relationships between upstream and downstream activities within the watershed.[1]

Watershed planning and management require that when taking action within a basin you consider the impact of that action throughout the basin, not only for the purposes for which the action is being taken such as flood control, but also for its interaction with all the other water uses in the basin such as hydropower, navigation, and water quality. Much credit is given, deservedly, to the Environmental Protection Agency (EPA) for what it labels a watershed approach; however, since it generally deals only with a subset of the water resources - water quality - it is not accomplishing true watershed planning and management.

Few people would disagree with the need for watershed planning and management and that where it has been properly used it has brought large rewards. A shining example of a watershed approach is found in the Tennessee Valley where in 1933 the President formed the TVA to develop the water and related land resources of the Tennessee Valley watershed in their entirety to serve multiple purposes. According to TVA, "Right from the start, [it] established a unique problem-solving approach to fulfilling its mission-integrated resource management. Each issue TVA faced—whether it was power production, navigation, flood control, malaria prevention, reforestation, or erosion control—was studied in its broadest context. TVA weighed each issue in relation to the others."[2] It also gave us the first illustration of what we now call Integrated Water Resources Management (IWRM).

In the 1960s, the Mississippi River Commission, which had been acting as an integrating mechanism for water resources development in the lower Mississippi Valley since 1879, carried out a comprehensive study of the water resources needs in the Valley. It recommended a framework program to "serve as both a short- and long-range guide in planning for the conservation, development, and beneficial use of the water and related land resources in the study region." [3] Since 1928, the commission has carefully managed navigation, flood control and related land resource activities to include environmental mitigation in the Lower Valley, treating it as an integrated watershed and operating it as a systems-based Mississippi River and Tributaries project.

Following the disastrous Great Mississippi Flood of 1993, a White House study team recommended that, in order to bring together the disparate activities of flood damage reduction in the upper Mississippi basin, the Congress assign responsibility to the Mississippi River Commission for that activity and establish an upper Mississippi River and Tributaries project.[4] No action was taken on this recommendation, and as we see today, the flood damage reduction activity remains disjointed and in need of reform.

On the negative side, failing to see the need for integration can have serious consequences. We all recognize that, for nearly 40 years, the nation invested heavily in hurricane protection for New Orleans through construction of levees and other structures without recognizing that the wetlands of the coastal Louisiana watershed were key elements of a natural/structural system that provided storm buffering for New Orleans and protection for the oil, gas, shipping, and fisheries industries that generate revenues for the state and the nation and sustain critical ecosystems.

If watershed planning and management make sense, why are they not being accomplished? There are several reasons:

- Institutional rivalries and authorities result in stovepipe approaches. When the Corps of Engineers was conducting its study of upper Mississippi navigation, its authorizations for the study included navigation, flood control and environmental restoration. As noted by a committee of the National Academies studying the project, because water quality issues to include sediment movement and other erosion fall under EPA and the Natural Resources Conservation Service (NRCS) and not the Corps, consideration of their impact on the navigation and the environment were not included in the Corps study. Similarly when the Corps conducted its review of the operations of the Missouri River-the so-called Master manual review - its focus was on mainstem flows and the purposes for which the Corps was authorized to operate the Missouri system - navigation, flood control, hydropower, and the impact of these operations on fish and wildlife. Because activities of the Bureau of Reclamation and the NRCS were outside the authorities of the Corps, there was no attempt to review how joint operation of the several hundred Bureau of Reclamation, NRCS, and private structures within the basin might improve the operation of the basin as a whole. Neither did the study examine how water quality and sediment flows might be improved through operation the basin as a system and what impacts this might have on a sediment deprived lower Mississippi River or the growing hypoxic zone at the Mouth of the Mississippi.

- The nature of the Congressional process supports this silo approach in dealing with activities in the watershed. In 1997, following the major flooding on the Red River of the North that inundated Grand Forks, East Grand Forks and other communities in North Dakota and Minnesota, Congress directed the Corps to both examine the basin as a whole and develop specific projects for the damaged communities. Appropriations were initially made available for both purposes but over time, interest in basin planning waned and the funds were directed to solving the immediate problems in Grand Forks and East Grand Forks and these projects have been completed. Yet today we still do not have a long term plans for the remainder of the basin or a good understanding of what new projects will do to the fragile level of safety that currently exists in the Canadian cities within the basin. History will show case after case where individual projects were authorized and funded without any consideration of the impact of these projects in the basin in which they exist. The Association of State Floodplain Managers efforts to promote a concept of "No Adverse Impact" in development of floodplains speak well to the watershed concept.

Watershed planning is not new. In 1927, Congress directed the Corps of Engineers to conduct comprehensive river basin studies across United States.[5] These studies provided the basis for much of the work that took place in the 1930s and 1940s including the TVA and work in the Columbia Basin. Unfortunately, when the President suggested expanding the TVA concept to other basins, the pushback from across the country was enormous as Governors, federal bureaucracies and private power providers saw a threat in basin authorities to their interests.

In 1965, under the Water Resources Planning Act, Congress authorized the creation of voluntary federal-regional-state basin commissions to deal with issues in large basins and six commissions were formed. However, these basin commissions were eliminated by President Reagan in 1983 because they were seen by many to have become large bureaucracies and, to the states, to be intruding on the authorities of the states. Although there was hope that states would form organizations to coordinate regional water planning, the hope has not materialized. In effect we have had little effective basin or watershed planning in this country over the last 25 years. While reforms to the basin planning process were certainly needed, the elimination of basin commissions became a case of throwing out the baby with the bathwater

What then is required to get watershed/basin level planning off the ground?

- There must be better coordination among federal agencies and the states within the basins.

- There must be better coordination among Congressional committees authorizing and funding water programs and their committee reports must reflect their interest in basin and watershed planning.

The Administration, Congress and the states must develop an approach for management of activities within the watershed. This can be basin commissions or some other structure to coordinate the efforts of the federal and state agencies. One federal agency could be assigned as federal watershed integrator charged with coordinating the federal activities within the basin and leading the interaction with the states in the basin. States could be given the responsibility with the federal government in a supporting role. The current work of the state of Texas on its state water plan illustrates this bottoms-up approach very well.

One hundred years ago, when our nation was expanding its boundaries, the opportunity for basin level planning was neither technically nor politically feasible. It would have been difficult to know what was going on a timely basis throughout a large watershed so that one agency could lead the effective use of the resources of that basin. Now, with modern technology, the needed information can be rapidly assembled, analyzed and given to those people and agencies that will make the decisions

Our expertise with the tools – models and techniques – needed for comprehensive planning has also improved and the nation has become more aware of the inter-linkages among the various components of its water resources. Finally, stakeholders are now much more able to participate in the technical aspects of water planning, and increasingly, are demanding that involvement. That is a good thing. And we, as a water community, are beginning to develop approaches to breach those silo walls. For example, when I was with the International Joint Commission, I supported an approach called shared vision planning in the five year study of a new plan for Lake Ontario regulation. During that study, the commissioners, scientists and stakeholders worked together using this approach. Everyone got a chance to suggest new ideas for regulating water levels and flows, and together they designed a single computer simulation that tracked all the impacts that participants said they worried about. This didn't magically eliminate the differences in values among stakeholders, and now that the study is done and the IJC has issued a draft decision, there is still conflict about the best solution. But because of the shared vision

approach, the arguments are much more about values than facts, the differences are more manageable, and we can chart a much clearer path with adaptive management to an even better solution over time. This approach has been successfully applied in other studies since the early 1990s, and the International Joint Commission decided to use it again for its study of the Upper Great Lakes. More and more states are incorporating this approach into state water planning. Similar Computer Aided Dispute Resolution methods are being used in Europe and Australia.

The National Science and Technology Council's Subcommittee on Water Availability and Quality has recognized the importance of these ideas and developed an interagency initiative focusing on this integration of computer tools within multi-stakeholder public decision process for water management. The Corps, USGS, Sandia National Laboratories, the U.S. Institute for Environmental Conflict Resolution, and other federal partners are participating [6]

While the United States has put watershed planning on the back burner, other nations have not. There are lessons we can learn by observing the ongoing actions of those who are already implementing large-scale watershed planning and its corollary integrated water resource management.

A 2000 European Union Water Framework Directive established a legal framework to protect and restore clean water across Europe and ensure its long-term, sustainable use.[7] This water framework directive outlines the responsibilities of EU nations within multi-nation river basins for the integration of their activities both within the national areas and across international boundaries and calls for the use of integrated water resources management. The EU notes that:

> The best model for a single system of water management is management by river basin - the natural geographical and hydrological unit - instead of according to administrative or political boundaries. Initiatives taken forward by the States concerned for the Maas, Schelde or Rhine river basins have served as positive examples of this approach, with their cooperation and joint objective-setting across Member State borders, or in the case of the Rhine even beyond the EU territory. While several Member States already take a river basin approach, this is at present not the case everywhere. For each river basin district - some of which will traverse national frontiers - a "river basin management plan" will need to be established and updated every six years, and this will provide the context for the co-ordination requirements identified above.

Over the past eight years, the nations of the EU have been working diligently to ensure that each and every water resource related action is examined in the context of how it will affect the other aspects of water resources in the shared basins and watersheds. Understanding that upstream pollution has significant impacts downstream and acting on this knowledge has improved relationships among the nations and has resulted in water resources that are more sustainable.

Australia has long faced severe water shortages in many parts of its country and, over the last two decades, has turned to watershed management to ensure that its waters are used effectively and that decision-makers consider the balance among the multiple uses of this resource.

The Australians speak to Integrated Catchment Management (ICM). Since Australia is a federation of states implementation falls to the state level. The national government provides for comprehensive water reform and policy directions through various incentive programs and, to the extent possible, avoids intruding in actions that are considered states' rights. (roles and responsibilities)

An Australian colleague of mine, Dr Bruce Hooper, offered me his assessment of the Australian experience with basin management noting that:

- Success occurred in most states where there was:
  - Strong local leadership by catchment management organizations who coordinated with State and Federal government and irrigation & ranching sector groups to solve mutual problems (salinity, eutrophication, land degradation),
  - Clear specification of roles and responsibilities of stakeholders (by catchment organizations, government agencies, individuals, water utilities),
  - Demonstrated improvements in the short term in resource condition (which were monitored and reported)
  - Ongoing national funding and use of cost-sharing contributions by stakeholders.
- Success has occurred in large basin ICM (Murray-Darling especially) due to:
  - Recognition of a common threat (salinity)
  - Top-down political leadership from Australian Government while recognizing States' water rights and contributions to local land and water management programmes through funding partnerships;
  - Emerging use of environmental water allocations;
  - Effective community involvement at top levels through the 22-member Community Advisory Committee of the MDB Commission;
  - Ongoing commitment by Federal Government to funding despite different political parties in power over 20 years.
- Bottom-up meets top-down is a major challenge to implementing ICM:
  - There remain few coordination mechanisms between Local Governments and catchment management organizations; There is an emerging concentration of power in the 2000's by some State Government agencies, withdrawing funding and reducing the roles of catchment management organizations.[8]

Like the European nations, Australia has found that the integration that is achieved through catchment management has reduced conflicts over water, improved the efficiency of the use of the resource and more fully involved the stakeholders in solving the problems the nation faces.

Watershed planning eliminates long-term problems. I would urge the Congress to carefully examine the projects it authorizes to ensure that these projects, as authorized, are set within a watershed context and that the authorization and eventual funding by the Congress is not creating problems. Some will say that it is a responsibility of the agencies to identify such

problems, but I should note that since projects are approved on an individual basis by Congress without the consideration of basin/watershed needs, it is almost impossible for a federal agency to develop broad scale watershed approaches simply because they not given the fund nor the authorities for such activities/

Much of the information that is needed for effective watershed planning is here. More is certainly required to do it well, but that is not a reason stop forward movement using watershed-based approaches. I would urge Congress to authorize and fund Federal agencies working in coordination with the states to develop and implement standard practices for watershed planning and management based on the principles of proven advances such as shared vision planning.

Thank you for your attention.

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[1] Interagency Floodplain Management Review Committee, Executive Office of the President. 1994. *Sharing the Challenge: Floodplain Management into the 21st Century.* Washington, GPO. (available at http://www.floods.org/Publications/free.asp).

[2] See UCCE Rangeland Fact Sheet 33 at http://danr.ucop.edu/uccelr/h33.htm

[3] http://stinet.dtic.mil/oai/oai?verb=getRecord&metadataPrefix=html&identifier=ADA041343

[4] Interagency Floodplain Management Review Committee, Executive Office of the President. 1994. *Sharing the Challenge: Floodplain Management into the 21st Century.* Washington, GPO. (available at http://www.floods.org/Publications/free.asp).

[5] 21 January 1927, Public Law 560, 7Oth Congress --River and Harbor Act.

[6] www.iwr.usace.army.mil/CADRe/).

[7] Its official title is *Directive 2000/60/EC of the European Parliament and of the Council of 23 October2000 establishing a framework for Community action in the field of water policy.*

[8] Personal correspondence, Dr Bruce Hooper, DHI, June 6, 2008